



Original Contribution

Predictors of desaturation during patient transport to the postoperative anesthesia care unit: an observational study^{☆,☆☆,★}



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Abstract

Background: The transport of postoperative patients to the postoperative anesthesia care unit (PACU) is a high-risk period for hypoxemia. The aim of this study was to determine risk factors for hypoxemia during transfers to the PACU.

Methods: An observational, prospective, monocentric, and noninterventive study was conducted in the University Hospital of Toulouse in 2015 during a 5-week period. All patients who were transferred to PACU were included. Twenty-eight variables related to patient, surgery, and anesthesia were recorded. Hypoxemia during transfer was defined as SpO₂ <90%.

Results: Five hundred five patients were included. The incidence of hypoxemia during transfer was 13%. After logistic regression analysis, 3 risk factors for desaturation were identified: sedation score >2, SpO₂ <96% before exiting the operating room (OR), and body mass index >30 kg/m². The 72% of patients were transferred without oxygen. Most of the hypoxemia appears in these patients.

Conclusion: The development of hypoxemia during transfer from the OR to the PACU was greater in patients who were obese, were more sedated, or had lower oxygen saturations upon leaving the OR. The rates of hypoxemia were greater among patients in whom supplemental oxygen was not administered. Supplemental oxygen should be considered in higher risk patients.

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1. Background

The transfer of patients from the operating theater (OT) to the postoperative anesthesia care unit (PACU) is considered to be a high-risk period for the development of hypoxemia [1]. The incidence of arterial desaturation is highest during the first 20 minutes after extubation leading to a tissue hypoxia with principally cardiac and neurological consequences [2]. Postoperative hypoxemia is frequent and appears early from extubation so often during the transfer of the patient to the PACU. It is involved in postoperative morbidity, mainly by cardiac (ischemic or rhythmic) and neurological (acute confusional state that could give rise to postoperative delirium) repercussions [2].

In light of these observations, the principal objective of this study was to determine the risk factors for postoperative desaturation during the transport of the patient from the OT to the PACU. We also wanted to calculate the incidence of postoperative hypoxemia.

2. Methods and materials

2.1. Plan of study

This was a prospective, observational, monocentric, and noninterventive study. It was carried out at Toulouse University Hospital for a 5-week period (during the hours from 8 AM to 6 PM, excluding weekends). The study was approved by the Ethics Research Committee of the University Hospital of Toulouse (France) on December 18, 2014 (project no. 93-1214).

2.2. Study population

The aim was to include as many patients as possible during the 5 weeks of observation to allow a multivariate analysis on the 10 most significant criteria. Patients were included, irrespective of respiratory history, nature of surgery, and presence of risk factors for postoperative hypoxemia. All types of surgery undertaken in the surgical unit were included, namely, plastic, vascular, urological, gynecological, and digestive surgery, both emergency and elective. This allowed the global evaluation of the incidence of postoperative hypoxemia.

Inclusion criteria were as follows:

- patients older than 18 years undergoing surgery under general or regional anesthetic (peripheral or central);
- extubation on the operating table.

Exclusion criteria were as follows:

- preoperative hypoxemia, determined by an peripheral capillary oxygen saturation (SpO₂) reading of <90% in ambient air;
- the patient entering the surgical unit having had oxygen therapy;

- problems in taking an SpO₂ reading;
- intraoperative use of methylene blue (methylthionium chloride).

2.3. Data collection

Data were collected prospectively by an independent observer, a student nurse anesthetist, trained in research and with no involvement in care of the patients. To avoid bias, the nurse anesthetists and anesthetists who effected the transfer of patients to the PACU were not informed of the objectives of the study. Only the nurse anesthetists and recovery nurses working in the PACU were informed. The aim of the study was disclosed once data collection was complete. The decision to administer oxygen therapy or not was left to the discretion of the anesthetist and nurse anesthetist and not dictated by a protocol.

2.4. Judgment criteria

The principal criterion of the study was the appearance of hypoxemia characterized by an SpO₂ reading of <90% during the transfer to the PACU [3,4]. Hypoxemia was categorized as mild (90% > SpO₂ ≥ 86%), moderate (86% > SpO₂ ≥ 81%), and severe (SpO₂ <81%) [3].

2.5. Data collection

Data collection was devised for the precise and rapid collection of data. A pretest was performed before the commencement of the study to optimize collection. The collection of information commenced from the start of the transfer of the patient and continued in the PACU. Certain variables were extracted from patients' medical records.

Transfer time for the purposes of this study was defined as the time between the patient leaving the OT and the commencement of monitoring in the PACU.

To determine the factors predictive of desaturation, we examined 28 criteria. These criteria were selected based on bibliographic research [1]:

- Patient-related criteria were age, sex, American Society of Anesthesiology score, weight, height, body mass index (BMI), smoking status, and respiratory predisposition (including asthma, sleep apnea syndrome, and chronic respiratory insufficiency).
- Criteria linked to the surgical procedure were the surgical specialty, the surgical approach, the intraoperative positioning (dorsal decubitus [DD], sitting, lateral decubitus, and ventral decubitus), whether the surgery was emergency or elective, and the necessity of transfusion.
- Criteria relating to the anesthetic were duration of anesthesia, type of anesthetic, management of airways, utilization of neuromuscular blocking drugs, and reversal.
- Criteria relating to the transport of the patient were duration of transfer, SpO₂ reading on exiting the OT, whether

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